FIFTEENTH
ANNUAL REPORT

FROM THE

ANALYTICAL LABORATORIES

OF

SOUTHALL BROS. & BARCLAY

(LIMITED).

EDITED BY

E. W. MANN, PH.C., F.C.S.

BIRMINGHAM,

JANUARY, 1907.

PRIVATE PRESS OF

SOUTHALL BROS. & BARCLAY, LTD.

PREFACE.

WE were glad to find that our last Report was received with undiminished interest, and trust that the present number will enjoy an equally favourable reception.

The increasing number of enquiries received from eminent pharmacists and analysts, both at home and abroad, seems to indicate that these Annual Reports have proved of interest and value to them, and this encourages us to continue and to extend the scope of our yearly publication. Late in the year came the issue of a new series of official "Recommendations" with respect to Pharmacopœia revision, many of which may well be be considered in the light of the figures and results we have ourselves obtained and published from time to time. We comment briefly upon a few of the proposed alterations, as in some cases we are unable to agree with the result of their findings, and regret that time has not allowed the full consideration to which they are entitled as the work of a Committee of Pharmaceutical experts.

A considerable amount of work has been done in the Laboratory upon the subject of Strophanthus, and we reprint here the note upon this subject read before the Birmingham meeting of the British Pharmaceutical Conference.

The application of the principle of Physio-toxic Standardisation has been extended to the preparations of Strophanthus, and we deal with this and with the disputed question of the correct process for use with Ergot in these pages, noting that an eminent pharmacologist has pronounced in favour of the method we have adopted.

In all, 6,800 different samples have been examined during the year, and from this mass of material we have endeavoured to draw such a selection as will provide matter of interest to all pharmacists.

CONTENTS.

PAGE.
Preface 3
Crude Drugs, Fixed Oils, etc. 5
Strophanthus and Strophanthin 15
Essential Oils 21
Chemical Preparations 26
Galenical Preparations 29
The Recommendations of the Committee of Reference in Pharmacy 34
Physio-toxic Standardisation 37
Table of Standards for Galenicals 39
"Standard" Powder Sets 46
Guarantee of B.P. Quality 47
The Qualified Retail Chemist and Analytical Work 48

CRUDE DRUGS, FIXED OILS, WAXES, etc.

A YEAR'S record of the work included under this heading in the analytical laboratories of a manufacturing house, comprises the result of a very large number of evaluations and other tests. Many of these are of a routine character but others present interesting or abnormal features, and it is mainly from the latter class that we have drawn our selection. We have not, however, neglected to submit results obtained from ordinary commercial samples, for we think that such should prove of value in considering the practicability or otherwise of the standards from time to time proposed for such drugs.

DATA.

Unless otherwise specified, the following data apply to all figures given in the following pages.

Specific gravity .. $d\frac{15\cdot5}{15\cdot5}$°C.
Optical rotation .. =degree of rotation, with sodium light, using 100 mm. tube.

Temperature in degrees centigrade.

Acid, Ester, Saponification values are equivalent in each case to the number of milligrammes of KHO required for 1 gramme of the substance, to neutralize the acid, saponify the Ester, or in the case of saponification to the sum of these two.

Aconite Root.—Two samples were assayed for total ether-soluble alkaloid, the amounts obtained being respectively 0·25 and 0·45 per cent. by titration calculated as aconitine. Both samples contained a very large proportion of roots crowned with stems, and it is interesting to note that the U.S.P. monograph which lays down a minimum aconitine standard of 0·5 per cent. does not specifically exclude roots which have borne stems. We are making some experiments on the relative strength in alkaloid of the stem-and bud-crowned roots and hope to include the results in our next report.

Almond Oil.—Of the many samples submitted during the year, one was found to give, with the official nitric acid test, a slight but perfectly distinct peach colouration; this abnormality was also detected on the application of Bieber's test.

Aloes, Socotrine.—A dozen samples examined were of very unequal quality, the yield of cold water extractive ranging from 23·3 to 54·2 per cent. giving the low average of 38·6.

Ammoniacum.—Three specimens have been assayed, two proving of excellent quality.

Ash	1·61, 7·38, 2·46	per cent.
Soluble in 90 per cent. alcohol ...	75·28, 40·28, 70·44	,,

Asafetida.—We have found considerable improvement in the quality of this drug as met with during the year, three samples being of high grade, one of which practically corresponded with the excessively stringent solubility requirements of the British Pharmacopœia.

The actual figures were :—

Ash from 3·83 to 57·29 per cent., averaging 27·4.

Solubility in 90 per cent. alcohol from 11·16 to 62·04 per cent., averaging 38·8

Beeswax, white.—A large number of samples have been examined most of which were normal, a few exhibited the abnormality of low "acid value" commented upon in our thirteenth report (p. 6). In the other cases the figures (given below) are much more striking, gross adulteration being obviously indicated.

Acid figure	30·6	16·1	54·8
Saponification figure ...	83·8	120·6	101·0
Hübl ratio	1·7	6·3	0·86

Beeswax, yellow.—Out of fourteen samples examined three were held to be not genuine, two of these being largely composed of paraffin wax.

The actual results were :—

Specific gravity	0·958	0·923	0·914
Melting-point	62·5°	59°	59°
Acid figure	15·5	11·6	11·8
Saponification figure... ...	76·2	47·6	50·1
Hübl ratio	3·9	3·1	3·2
Paraffin (B.P. test modified)	suspicious indications	present	

Belladonna Root.—The percentages of total alkaloid by titration obtained from seven samples of root showed a very considerable amount of variation, the figures ranging from 0·19 to 0·66 per cent., and averaging 0·42.

Benzoin, Sumatra.—Twenty-five samples have been assayed for solubility in alcohol and for Balsamic Acids (for method, see Laboratory Report, No. 11, p. 30, or *The Chemist and Druggist*, March 15, 1902). The figures obtained, although slightly higher than last year, show a decided falling off as compared with the averages of preceding years.

Solubility in 90 per cent. alcohol	58·3 to 77·5	av. 69·2
Free Balsamic Acids, calculated as Benzoic Acid	5·31 to 11·55	„ 8·77
Combined Balsamic Acids, calculated as Benzoic Acid ...	8·90 to 12·35	„ 11·26

Benzoin, Siam.—The single sample of this drug examined proved to be of excellent quality, the figures obtained showing the great difference in composition between this and the Sumatra variety.

Solubility in 90 per cent. alcohol	...	93·30 per cent.
Balsamic Acids, calculated as Benzoic Acid	Free	2·59 ,,
	Combined	32·20 ,,

Cannabis Indica.—Eight samples have been assayed during the year, the total amount soluble in 90 per cent. varying between 12·16 and 17·88 per cent., averaging 14·96. The amounts of resin (determined on four samples only by washing the alcoholic extract with water) were 10·84, 11·52, 11·60, and 12·56 per cent.

Carmine.—A number of samples have been examined. The amount of mineral matter present showed considerable variation, ranging from 3·47 to 9·93 per cent.

Carnauba Wax.—The natural greenish-grey wax possesses characters which vary within comparatively small limits.

Eight samples gave :—

Melting point	82·5°	to 84° C.
Specific gravity	0·995	to 1·002
Saponification number ...	73·4	to 81·1

A further specimen offered as "bleached" Carnauba Wax was obviously mainly composed of a petroleum product.

Specific gravity	0·837
Melting point	71° C.
Saponification number	9·7

Cascara Sagrada.—Sixteen samples were assayed for cold water extractive, yielding 20·48 to 27·72 per cent., with an average of 24·3.

Castor Oil.—A number of samples of East Indian Oil were found to give saponification values of 177·6 to 184·1.

Catechu, pallid.—A single sample yielded 80·80 per cent. to alcohol (90 per cent.).

Chaulmoogra Oil.—A single specimen examined gave the following figures :—

Melting point	37·5° C.
Iodine absorption	97·44 per cent.
Saponification number	198·4

Coca Leaves.—Ten samples have been assayed, all of the Peruvian variety; the yield of total alkaloid ranged from 0·58 to 0·75, and averaged 0·69 per cent.

Cochineal.—A large number of samples have been examined, 50 per cent. of which proved to yield ash in excess of the 6 per cent. requirement of the British Pharmacopœia. All samples belonged to the silver grain variety. Ash-yield, 3·04 to 17·50, averaging 7·0 per cent. Water soluble matter, 28·2 to 46·3 per cent.

Cod Liver Oil.—A sample drawn in the Spring from the new season's "A1" Oil gave the following results :—

Specific gravity	0·9260
Saponification number ...	185·8
Unsaponifiable matter	1·09 per cent.
Free acid calculated as oleic ...	0·49 ,,
Iodine absorbed (18 hours) ...	162·47 ,,

Colour tests normal.

Copaiba.—We have again to record our experience that a large proportion of the parcels of Copaiba on the market give reactions more or less distinct when the colour tests are applied. Of the eleven samples submitted to examination, the results of which are recorded below, but one could be described as giving no reaction with these tests, while in no case could Gurjun Balsam be detected according to the indications of the resin acid factor (Laboratory Report, No. 12, p. 14).

Specific gravity ...	0·9679	to	1·0108	
Resin	36·4	to	64·9	per cent.
Acid figure... ...	47·44	to	91·81	
Ester figure ...	3·0	to	8·7	
Resin acid factor ...	0·61	to	0·79	

Another sample of Balsam was expressed from capsules offered at an exceptionally low price, and gave results which would appear to indicate gross adulteration. They are appended.

Specific gravity	0·9507	
Resin (soft in character) ...	42·22	per cent.
Acid figure	35·8	
Ester figure	17·0	
Resin acid factor	1·185	

Official colour tests, deep purple.

Cotton-seed Oil.—The analysis of three samples serves to show the uniformity and purity that this product attains:—

Specific gravity	0·922	to	0·923
Saponification value ...	192·7	to	196·6
Free acid as oleic	0·30	to	0·38%

Ergot.—Five samples were examined with respect to their yield of cold water soluble matter. The figures were 12·8 to 22·4 per cent., averaging 16·2. In our experience of this drug with regard to its therapeutic activity, we find that fluid extracts prepared from samples of high extractive are usually decidedly inferior in this respect to those prepared from a drug yielding comparatively little to water.

Fennel Fruit.—Four samples have been examined for yield to 70 per cent. alcohol. Soluble in 70 per cent., alcohol, 13·16, 12·24, 10·28, 8·8 per cent. The latter two figures were so low that for additional information the ethereal extract was determined by exhaustion with methylated ether, s.g. 0·717, and drying the extract over sulphuric acid. The figures so obtained were 13·4 and 6·8 per cent., and it would seem probable that the last sample was either partially exhausted, or else consisted of a mixture of sound and exhausted fruits.

Galbanum.—All three samples tested proved to be of good quality.

Ash	5·01	4·73	5·61	per cent.
Soluble in 90 per cent. alcohol...	59·36	53·08	45·92	,,

Guaiacum Resin.—Eight samples have been examined and found to give the following amounts soluble in alcohol (90 per cent.), 66·2 to 97·6 per cent., average 84·0 per cent. In no case did the copper acetate test of the U.S.P. give any reaction for colophony.

Henbane, Egyptian.—A parcel imported direct from Egypt for the preparation of our special tincture, was assayed and proved to contain 0·91 per cent. of alkaloid by titration, a figure considerably higher than those previously obtained, and one which suggests that this drug would prove a valuable addition to the official Materia Medica.

Ipecacuanha.—Ten samples have been assayed with fairly uniform results, the figures for total alkaloids by titration ranging from 2·09 to 2·37, with an average of 2·28 per cent. The method of assay adopted was that of the U.S.P.

Jaborandi Leaves.—Our work during the past year has confirmed the results of the investigation into the quality of commercial Jaborandi Leaves published in our last Report (No. 14, p. 13, also *Pharmaceutical Journal* [4] 21, p. 788), in which we found that ordinary Jaborandi consisted of the leaflets of *Pilocarpus Jaborandi*, and was practically worthless as far as alkaloidal content was concerned. Five samples of Jaborandi (*P. pennatifolius*) have yielded amounts of total alkaloid ranging from 0·07 to 0·15 per cent., two samples of the leaflets of *P. microphyllus* gave 0·55 and 0·63 per cent. respectively, while another of Ceara Jaborandi (*P. trachylophus*) proved to contain as much as 0·75 per cent.

Jalap.—Seventeen samples of Jalap have been assayed for resin, no one of which satisfied the official standard, the average figure obtained being the worst we have yet met with. Total resin, 3·8 to 8·4, averaging 6·3 per cent.

Japan Wax.—The following are the results obtained from the examination of five samples of Japan Wax:—

Melting-point	52° to 53°		
Iodine absorbed...	8·64 to 12·17	aver.	10·55 per cent.
Saponification number ...	206·7 to 223·6	,,	217·7 ,,

Mustard Oil, expressed.—Saponification value determined on three samples was 172·9, 174·4, 177·2.

Neatsfoot Oil.—We have met with but one specimen of this oil during the twelve months giving the high Iodine absorption figure which in our experience used to characterize commercial oils. The actual results were:—

	Normal (4 samples).	*Impure Commercial.*
Saponification number...	193·1 to 194·7	193·7
Iodine absorbed ...	70·23% to 71·87%	95·26%

Olive Oil.—A large number of samples have passed through our hands without any unusual features being observed. Experiments on mixtures of Olive and Cottonseed Oils have shown us that the Halphen colour reaction gives more decided indications of the presence of the latter than the official test, which is also liable to the objection of sometimes giving reactions with genuine oils. We find the delicacy of the Halphen test to be increased by placing the tube in boiling brine rather than boiling water.

Olive Oil.—	Saponification number	187·9 to 194·3
	Iodine absorbed ...	77·55 to 85·56%
	Free acid as oleic ...	0·51 to 11·48%

Opium.—All samples examined have proved to contain such an amount of Morphine as would require considerable dilution to reduce to 10 per cent. when the Opium is dried and powdered.

Morphine	8·95 to 10·70%
,, (on dry Opium) ...	11·7 to 14·4%

Palm Oil.—Three samples examined.

Free fatty acid as palmitic ...	14·82,	20·42,	20·60
Saponification number ...	202·4,	203·1,	204·6

Podophyllum.—Five samples of the American Root yielded from 4·00 to 5·64 per cent of resin, averaging 4·73. These figures are considerably better than we have had to report in the past.

Saffron.—A large number of samples have been examined, moisture present varied from 8·02 to 15·4 per cent., mineral matter (calculated on the dry saffron) from 2·42 to 6·90 per cent. It is interesting to note that in no case did the amount of ash exceed the B.P. limit, but it is also important to follow that work and observe whether deflagration occurs on ignition, one of the above specimens deflagrating with considerable violence when burned and proving to contain ammonium nitrate.

Sesame Oil.—We again find the constants for this oil to vary very little. The results for three samples are :—

Specific gravity	0·921— 0·922
Saponification number	189·0 —190·9

Shellac.—The two samples examined gave very satisfactory figures, both being probably pure shellacs. Parry (*C. & D.*, Jan. 31, 1903) gives 8 to 9 per cent. as an average figure for iodine absorption but also instances pure shellacs, giving results as high as 11·0 per cent. The actual figures were :—

Acid value	55·7,	52·0
Ester value	178·2,	155·0
Iodine number (Hübl-18 hours)	10·5,	8·0%

Sperm Oil.—Of the nine samples examined, seven may fairly be described as normal, the results obtained varying between comparatively small limits.

In seven normal samples :—

Specific gravity	0·8785	to	0·881
Saponification value	122·1	to	126·4
Iodine value	81·2	to	87·4%
Unsaponifiable matter	37·36	to	39·52%
Fatty acids	59·98	to	62·42%

Of the other two samples, No. 1 in all probability contained mineral oil and No. 2 fatty oil.

	No. 1.	*No. 2.*
Specific gravity	0·879	0·8945
Saponification value	102·9	137·1
Iodine value	81·78%	93·62%
Unsaponifiable matter	48·40%	32·84%
Fatty acids	50·61%	66·12%

Spermaceti.—Saponification value determined upon eight samples, in other respects answering the B.P. requirements ranged between 122·7 and 129·6.

Strophanthus and Strophanthin.—Ten years ago the late Mr. John Barclay (*Pharmaceutical Journal*, November 28, 1896) described a method for the assay of tincture of strophanthus based upon the determination of the strophanthidin yielded by the hydrolysis of the strophanthin present. This method he at a later date extended to the extract introduced by the compilers of the 1898 Pharmacopœia. The process was expeditious and gave concordant results under similar conditions, and, indeed, as recently as September, 1905, Cæsar and Loretz have published a method the essential principle of which is identically the same, but which is vitiated by the introduction of hydrogen sulphide to remove excess of lead salts, Fraser (*Pharm. Journal*, July 23, 1887) having shown that the presence of this compound is sufficient to cause more or less decomposition of the strophanthin. The editor of this report, however, well remembers that Mr. Barclay would have preferred a method involving direct determination of the active principle, and not of a decomposition product, since, in addition to other objections, there was a possibility that the evaporation of an aqueous solution of strophanthin in contact with the organic acids of the seeds might result in partial hydrolysis. It was also felt, in view of later work, that, unless the seeds used in the preparation of the tincture had been accurately verified, the determination of strophanthidin would afford no criterion of the therapeutical value of the tincture.

The experiments of which this note forms a report were undertaken with the above object, and although it is to be regretted that the results are, to a certain extent, of a negative character, it is hoped that they will not be without value.

Four specimens of seeds were taken; they were:—

(1) Seeds from a commercial parcel, origin unknown, but with 100 per cent. giving a green reaction with 80 per cent. sulphuric acid.

(2) Seeds of *Strophanthus Kombé*, "Mandala brand," 100 per cent. giving green reaction.

(3) Seeds of *Strophanthus Nicholsoni*, described by E. M. Holmes (*Pharm. Journal*, September 4, 1897) and kindly verified by him. These seeds gave a distinct red reaction with the acid test.

(4) Seeds of *Strophanthus gratus*, which were guaranteed authentic, and gave a yellowish pink colour with the above reagent.

The method of examination was as follows:—100 Gm. of the seeds was powdered and exhausted with petroleum spirit; the oil was separated and incidentally examined on the usual lines. The oil-free powder was air-dried, transferred to a Dreschel extractor, and percolated for thirty hours with boiling absolute alcohol; percolate was evaporated and the residue, when cold, taken up with water. To this aqueous liquid a slight excess of solution of basic acetate of lead was added, the liquid filtered, filtrate treated with excess of sodium sulphate, filtered, filtrate evaporated at low temperature with 10 Gm. of fine sand. The product was powdered and exhausted in a Soxhlet tube with boiling amyl alcohol; the bulk of the solvent was removed on a water-bath and evaporation and drying completed at 60° C.*

The characters of the oils are subjoined, and do not exhibit any marked variation:—

—	*S. Kombé* (?).	*S. Kombé. Mandala.*	*S. Nicholsoni.*	*S. gratus.*
Percentage of oil in seeds ...	34·08	34·76	20·90	35·01
Specific gravity of oil	0·9249	0·9278	0·9219	0·9230
Free acid calculated as oleic, per cent.	7·55	6·84	14·84	5·17
Saponification number	192·6	189·7	190·5	191·3
Iodine absorbed in 18 hours, per cent.	100·7	99·4	99·7	93·3
Melting-point of fatty acids	33° C.	33° C.	33° C.	29° C.

---

* The small amount of mineral matter present may be determined and deducted.

The strophanthin obtained by the method described was in each case crystalline, slightly reddish in colour, and highly deliquescent; recrystallised from amylic alcohol, long colourless needle crystals were obtained, which gave highly characteristic colour reactions with sulphuric acid. Each specimen of strophanthin proved to be very slightly dextro-rotatory in alcoholic solution, while in no case could a sharp melting-point be obtained for the anhydrous glucoside. The results obtained from this examination are as follows:—

—	*S. Kombé.*	*S. Kombé. Mandala.*	*S. Nicholsoni.*	*S. gratus.*
Strophanthin, per cent.	7·27	6·87	3·69	7·76
Colour reaction of strophanthin with 80 per cent. sulphuric acid	deep green	deep green	brown	brown
Strophanthin per cent. as determined by the strophanthidin method.....................	9·36	8·92	7·36	3·88

These latter figures in the cases of *S. Nicholsoni* and *S. gratus* exhibit such marked variation from those obtained by the direct method as to suggest that some essential difference exists in the chemical composition of the different glucosides; and, in view of the recommendation of Thoms and others (*Pharm. Journal*, April 30, 1904), that *S. gratus* should be recognised as the German official source of strophanthus, the point is one of considerable importance. This peculiarity of behaviour is also marked when the results of testing physiologically are considered.

These physiological tests were kindly undertaken by Professor R. F. C. Leith, M.A., M.B., F.R.C.P., of Birmingham University, and for this purpose crystallised specimens of strophanthin were prepared by the above method from three of the varieties of seeds examined. The strophanthin was made up into a solution in 70 per cent. alcohol, representing 0·2 Gm. of the glucoside in 100 mils, the strength being fixed at this in order to approximately represent the tincture in strength as assayed by the strophanthidin method.

Professor Leith conducted his experiments upon frogs, and his results are outlined below, the different strophanthins being distinguished according to Arnaud's suggestion, by the initial letter of their specific names.

Using solutions of the above strength, and diluting the dose before injection with normal saline, it was found that N-Strophanthin in doses of ¼ and ¾ minim produced no effect; 1 minim produced a quickened respiration, and 1½ minims injected into a fourth frog also caused some quickening of respiration; but all the frogs were alive and apparently well some weeks after the injection.

Using K-strophanthin, no apparent effect was produced by ¼ minim dose; ¾ minim produced rapid breathing, whilst 1 minim caused signs of illness; 1½ minims, however, was sufficient to cause death within an hour.

G-strophanthin, as before, caused no apparent illness in ¼ and ¾ minim doses, but a 1 minim dose sufficed to kill a large and active frog within three hours; whilst 1½ minims destroyed life in a similar specimen within sixty-five minutes.

The minimum lethal dose per 100 Gm. of frog is therefore as follows:—N-strophanthin, not within the limits of the experiments; K-strophanthin, 5 minims; G-strophanthin, 3·8 minims. Continental workers have testified to the activity of G-strophanthin, and these results bear out their opinions. K-strophanthin is not far removed in its toxicity, whilst the Nicholsoni glucoside is comparatively feeble, or even inert.

Considering the whole question, these results appear to point that it is possible to chemically standardise strophanthus and its preparations, but that the standardisation can only have a real value when the botanical character of the seeds is fully established, and, failing this, the activity of the drug can only be tested by physiological experiments, and even here we are confronted by the fact that the active glucoside in *Strophanthus gratus* exhibits decided variation from that present in the official variety, and may not be strictly comparable in its physiological effects upon human beings.

In a private communication received by the editor of this report, Professor Dr. Feist calls attention to his work on this subject (*Year Book of Pharmacy*, 1898, p. 54; 1901, p. 167) and shows that the strophanthins characteristic of the species *S. Kombé* and *S. gratus* are essentially different in chemical constitution. He also finds that the K-strophanthin and a glucoside isolated from a species of Strophanthus (not identified) giving a red reaction with H_2SO_4, differ in their yield of strophanthidin and toxicity.

Professor Feist considers that G-strophanthin is identical with Arnaud's ouabain and that this name should have the preference both for reasons of priority and the difference in chemical constitution also with the advantage of lessening the liability to confusion between these bodies. We cannot, in the absence of more complete investigation, subscribe unreservedly to Dr. Feist's conclusions, but we think that the results we have obtained, without doubt, support his view that the different varieties of Strophanthus contain glucosides essentially different in their toxic effect and as judged by the Strophanthidin yield, different in chemical constitution.

Styrax.—A number of samples have been examined with results showing extreme variation, a single sample only reaching the standard for combined balsamic acid we have been accustomed to expect for this drug.

The actual figures are:—

Soluble in 90 per cent. alcohol ...	71·05	68·73	70·78	69·13	69·88	73·7
Insoluble in 90 per cent. alcohol ...	4·25	8·13	5·75	3·64	7·14	3·50
Free balsamic acid as benzoic ...	2·87	1·71	1·18	1·43	2·27	1·40
Combined balsamic acid as benzoic	9·02	5·84	8·21	4·13	8·36	20·61

Tolu Balsam.—Eight samples were examined with results which do not show any great departure from normal.

Soluble in 90 per cent. alcohol	82·48 to 91·23%
Insoluble ,, ,,	0·51 to 2·91%
Free balsamic acid as benzoic	9·88 to 14·14%
Combined ,, ,,	15·69 to 25·79%

ESSENTIAL OILS.

Aniseed.—The three samples examined proved to be more uniform in quality than those met with last year.

Specific gravity at 20° C....	0·986	to	0·990
Rotation	–0·10°	to	–0·31°
Congealing point	13·5°	to	15° C.
Melting point	17°	to	18° C.

Bergamot.—We again find this oil to lack the solubility in 80 per cent. alcohol which is usually attributed to it. Three samples examined gave:—

Specific gravity	0·881	0·881	0·879
Linalyl Acetate	37·79	41·06	35·54%
Non-volatile residue ...	4·08	4·65	5·20%
Solubility in 2 vols. of 80 per cent. alcohol	Good.	Not wholly soluble.	

Cajuput.—Specific gravity determined upon 11 samples ranged from 0·918 to 0·9215, all giving a satisfactory reaction with the official test for Cineol.

Camphor.—Illustrating the variability of this oil as met with in commerce, the following figures for four samples are of interest:—

Specific gravity ...	0·896	0·898	0·997	0·895

Cardamoms.—A single specimen tested gave normal results:—

Specific gravity	0·935
Rotation	+33·75°

Soluble in an equal volume of 80 per cent. alcohol.

Caraway.—Two samples of this oil (English) and a single one of Carvol all proved satisfactory.

	Caraway Oil.		*Carvol.*
Specific gravity ...	0·912	0·913	0·965
Rotation	+78·95°	+77·65°	+59·65°
Distillate below 185° C.	5%	8%	—
,, above 200° C.	56%	56%	98%

Cassia.—Neither of the two samples examined could be described as of first-class quality. Their characters were:—

Specific gravity	1·059,	1·059
Cinnamic aldehyde	75·0,	73·1%

Both were soluble in 4 volumes of 70 per cent. alcohol.

Cinnamon.—Five samples, all purporting to be true bark oils, gave the following figures:—

Specific gravity	1·021 to 1·024
Cinnamic aldehyde	68·0 to 76·4%

Citronella.—Three samples have been examined, all possessing the characters of genuine oil.

Specific gravity	0·902 to 0·904
Rotation	−9·85° to −11·91°
Geraniol content	56·7 to 59·4

All clearly soluble in 3 volumes of 80 per cent. alcohol, and with very slight turbidity in 10 volumes of 80 per cent. alcohol.

Clove Oil.—A considerable number of samples have been assayed for Eugenol by treatment with 5 per cent. Caustic Potash solution with little varying results:

Specific gravity	1·049 — 1·052
Eugenol	86·5 to 88·2%

Coriander.—Three samples examined, all of which possess very similar characteristics.

Specific gravity ...	0·871	0·873	0·878
Rotation	+11·05°	+11·35°	+10·60°

All soluble in 3 volumes of 70 per cent. alcohol.

Cumin.—Two specimens subjected to the usual tests proved to be rather less soluble than those examined last year, although genuine oils.

Specific gravity	0·910,	0·903
Rotation	+4·05°,	+4·70°

Solubility in 80 per cent. of alcohol, 1 in 9, 1 in 10.

Fennel.—The only sample tested gave very satisfactory results.

Specific gravity	0·970
Rotation	+13·85°
Congealing point	+6° C.

Lavender.—We again find very considerable variation in the " ester content " of this oil, the percentages actually found in the eight samples soluble in 3 volumes of 70 per cent. alcohol ranging from 22·92 to 30·40. The former amount can scarcely be regarded as a satisfactory figure for a foreign oil, although the sample in question correctly answered the official tests.

Nutmeg.—A single sample proved to possess normal characters.

Specific gravity	0·906
Rotation	+16·86°

Orange, sweet.—The only parcel of this oil submitted to test during the year gave much more favourable results than those commented upon in our last report.

Specific gravity	0·849
Rotation	+96·25°

Soluble in 4 volumes of 95 per cent. alcohol.

Pennyroyal.—No objection could be taken to either of the oils we have put through the usual examination.

Specific gravity	0·936	0·940
Rotation	+19·45°	+15·25°

Each was soluble in 2 volumes of 70 per cent. alcohol.

Peppermint, Japanese.—Three samples of " dementholized " Japanese oils gave the following results :—

Specific gravity	0·899	0·899	0·900	
Menthyl Acetate	12·32	11·01	8·84	per cent.
Free Menthol	48·72	47·20	46·74	,,

Petitgrain.—The single specimen reported upon was an average one, giving :—

Specific gravity	0·889
Esters as Linalyl Acetate	45·31 per cent.

Pine (Pinus Pumilio).—A sample of this oil satisfactorily answered the requirements of the British Pharmacopœia.

Specific gravity	0·868
Rotation	−7·84°
Bornyl Acetate	5·30 per cent.
Distillate below 165°C	2 ,,

Rosemary.—Again we have to record the result of the examination of oils grossly sophisticated, a typical specimen of such oils gave :—

Specific gravity	0·886
Rotation	−1·7°C

An average sample of genuine foreign oil gave very different figures :—

Specific gravity	0·9065
Rotation	+6·35°

Rue.—

Specific gravity	0·836
Rotation	+0·2°
Solidifying point	+9°

The above results are characteristic of a genuine oil, and differ widely from those reported in our thirteenth Report.

Savin.—We have again to note that foreign distilled Oil of Savin, as met with in our Laboratory, is considerably less adulterated than in former years. A typical sample gave :—

Specific gravity	0·920
Rotation	+47·8°
Distillate below 200°C	38 per cent.

Soluble in an equal volume of 90 per cent. alcohol.

Sandal Wood Oil.—Considerable care is necessary before accepting parcels of this oil as genuine. Parry has shown that fractional distillates of the West Indian Oil (from *Amyris balsamifera*) are used for sophistication, and altogether the "blending" of this product appears to have reached the stage of a science. This warning is the more necessary where the oil is sold in capsules, and hence less readily accessible for testing.

A considerable number of the samples examined gave results varying within the following limits:—

Specific gravity ...	0·975 to 0·990
Rotation	−15·75° to −19·5°
Santalol	91·61 to 98·79 per cent.

All soluble in 6 volumes of 70 per cent. alcohol.

As an example of the oils, necessarily styled "suspicious," is the following:—

Specific gravity	0·972
Rotation	−16·10°
Santalol	89·14 per cent.

Not entirely soluble in 6 volumes of 70 per cent. alcohol.

Sassafras Oil.—The following characters possessed by a sample tested in the Laboratory indicate a heavy oil, rich in Safrol:—

Specific gravity...	1·086
Rotation	+2·32°

Turpentine.—We again have to report extreme variation in the optical rotation of samples of American Turpentine perfectly normal in other respects, and from reports received find ourselves not alone in this experience.

Rotation observed varied between −2·75° and +16·37°

CHEMICAL PREPARATIONS.

THE need for analytical control over the manufacture and purchase of Chemical Preparations is not less marked than with Galenical Preparations and Crude Drugs, and while of course this control is simplified by the more definite nature of the compounds met with, yet, on the other hand, the detection of minute traces of impurities calls for a very considerable amount of time and care.

Arsenic Testing.—We again put on record our appreciation of the test for Arsenic recommended by Drs. Dunstan and Robinson for inclusion in the forthcoming edition of the British Pharmacopœia. We find the method easy of application, and eminently well adapted for rapid pharmaceutical work. Traces of Arsenic, more or less large, continue to form an impurity which has to be carefully watched for, although we are able to note considerable improvement during the year.

Bismuth Salicylate.—We have had occasion to reject a sample of this preparation which gave abundant evidence of the presence of free Salicylic Acid; it was also proved to contain Carbonate.

Borax.—A large number of samples have been examined for Arsenic, a very large proportion showing less than 3 parts per million of this impurity. Two others contained 9 to 10 parts, while a third proved to contain as much as 45 parts per million, showing that need for care with regard to this article still exists.

Charcoal, Wood.—Mineral matter in samples examined ranged from 2·1 to 14·04 per cent., a figure as high as the latter only being possible from a large admixture of earthy matter.

Chromic Acid.—Two samples assayed by the method given in our fourteenth Report, p. 26, gave 84·1 and 63·0 per cent. of CrO_3 respectively, the latter containing a considerable quantity of Sulphuric Acid.

Citric Acid.—We still find this acid to be practically free from Lead and Arsenic.

Iron.—Three samples of pharmaceutical iron wire have been examined, containing from 100 to 200 parts per million of Arsenic, and all proving satisfactory with regard to the amount of carbon present.

Iron, Reduced.—The considerable number of specimens tested proved on the whole satisfactory. The results are as follow:—

Metallic Iron ...	77·61	to	92·07 per cent.
Arsenic	30	to	240 parts per million.

Pilocarpine Nitrate.—We have been unable to meet with a commercial specimen of this article melting at 176°—178°, the figures stated by authorities to be identified with the pure salt. Out of 12 samples the best melted at 170° C., another possessing a melting-point as low as 158° C.

Potassium Oxalate, Neutral.—We have lately found very considerable quantities of lead in this compound, 30 per cent. of the samples examined during the year proving to be largely so contaminated, and while it is true that the preparation does not obtain medicinal use, such an impurity cannot be considered as otherwise than highly detrimental for photographic purposes.

Sulphur Precipitated.

„ **Sublimed.**—Both of these forms of Sulphur have proved to attain a very considerable degree of purity with regard to Arsenic; among samples procured in the ordinary way, in no case did the amount present exceed 2 parts per million.

Tartaric Acid.—Lead present in the large number of samples examined ranged from 0·0001 to 0·0026, showing the improvement in this article, since, for example, our tenth Report, in which we had to report as much as 0·019 per cent. as a maximum.

GALENICAL PREPARATIONS.

MANY questions of interest to pharmacists have received attention during the year, among these is the consideration of the suitability of the British Pharmacopœia formula for Pil. Hydrarg. Subchlor. Co.; we give below details of our experiments in this connection and should mention here that these experiments were carried out at the suggestion of Sir James Sawyer, M.D., F.R.C.P., etc., a physician whose interest in true galenic pharmacy is so widely known and appreciated. To him also we owe the re-introduction of olive leaves into Materia Medica as a tonic, febrifuge and anti-periodic (see *P.J.*, October 6th, 1906, p. 376).

We are at present investigating the chemistry of this drug and hope to publish our results in due course.

Standardisation in its latest form—Physio-toxic Standardisation—has proved an unqualified success in enabling us to ensure the therapeutic efficiency and uniformity of certain widely used and potent galenicals to which the principle of chemical standardisation cannot be extended.

Belladonna, Green Extract.—The figure for this year's manufacture proved to be 1·25 per cent. of total alkaloids by titration, being a little higher than the average.

A sample from another source yielded 1·05 per cent.

Camphor Liniment.—As a precautionary measure we continue to assay every batch prepared, the actual results obtained varying from 21·43 to 22·30 per cent.

Cinchona, Concentrated Acid Infusion.—The average amount of total alkaloid in a number of carefully prepared samples of Acid Infusion of Cinchona we have found to be 0·13 per cent. and from this we think that a concentrated (1 to 7) infusion might well be required to contain 1·0 per cent. of total alkaloids and propose so to standardise our own preparation in the future.

Cinchona, Tincture.—A matter of very general interest to pharmacists is that of deposit in tinctures, and we may note that the dried deposit from an unassayed batch of 100 gallons of this tincture, which had been standing for some time, contained 13·03 per cent. of total alkaloids. This seems to us a matter of considerable importance, and we propose to make further experiments upon it.

Conium, Green Extract.—

Total alkaloid as hydrochloride 0·37 per cent.

Henbane, Green Extract.—The year's manufacture bulked and assayed yielded 0·11 per cent. total alkaloid by titration, a result which may be taken as an average one.

Nux Vomica preparations.—In our last Report (No. 14, p. 31) we criticized the process of the then recently published edition of the United States Pharmacopœia for the separation of Strychnine from Brucine giving the results of experiments showing that if the prescribed conditions be carried out the Brucine remains almost unaltered. We also detailed our experience with Keller's original method which we find to give very satisfactory results.

In a paper read before the British Pharmaceutical Conference at Birmingham, 1906 (Year Book, 1906, p. 226), Farr and Wright gave the results of experiments which confirm our statement that the U.S.P. test as it stands is worthless as a means of separating Strychnine from Brucine. During the year we have compared the figures for Strychnine obtained by Keller's and by the British Pharmacopœia process and have always found that Keller's method gives somewhat lower figures.

	A Solid Extract.	*Fluid Extracts.*
Strychnine B.P. method	8·36	6·42, 1·78, 1·51%
,, Keller's ,,	8·06	6·12, 1·66, 1·41%

Plummer's Pill.—(See *Lancet*, December 1, 1906). The following is a brief record of the experiments made under the direction of Sir James Sawyer who had found the ordinary Pharmacopœia Pill to be practically unacted upon by warm water, and in his experience to be liable to excretion unchanged from the human alimentary canal.

Eleven samples of pills were procured or prepared, and all examined under the same conditions by treatment with water for 48 hours with frequent agitation, the water being maintained at a temperature of 38° C.

The description of the various samples was as follows :—

1.—Ordinary B.P., coated.
2.— ,, ,, plain, but old.
3.—B.P. formula, with oil reduced.
4.—B.P. (?), plain, London dispensing house.
5.—B.P. (?), ,, local ,, ,,
6.—B.P. (?), varnished, London ,, ,,
7.—B.P. (?), plain, local ,, ,,
8.—B.P., plain, freshly prepared.
9.— ,, ,, ,, ,, with less oil.
10.— ,, ,, no oil, but using spirit as excipient.
11.— ,, ,, no oil or spirit, Syr. Glucosi as excipient.

Of these samples, Nos. 1, 2, 3, 6, 8, 9, and 10 practically resisted the action of the warm water for the whole period of the experiment.

Nos. 4, 5, 7, and 11 proved to disintegrate with considerable rapidity; especially was this the case with Nos. 4, 5, and 11.

The conclusion to be drawn seems to be that the present official formula is a very undesirable one for the administration of the medicinal ingredients of Plummer's Pill, and that this objection is not to be removed by the deletion alone of the Castor Oil, since No. 10 above, while entirely without oil, is equally insoluble with the official pill.

Sir James Sawyer's proposed formula calls for Syr. Glucosi as the only excipient. It produces a good pill, readily disintegrable, and, in our opinion, should replace the present unsatisfactory formula in a new edition of the British Pharmacopœia.

Since writing this note, Sir James Sawyer has called attention to the proposal of the Committee of Reference in Pharmacy to amend the official formula by the omission of Castor Oil, pointing out that this alteration effects little or no improvement in the solubility of the pill (see *P.J.*, 1907 [1], p. 3).

Podophyllin.—The following figures, reproduced from our Laboratory Journal, were obtained by the examination of samples of the resin by D. B. Dott's application of the well-known Ammonia test (*P.J.*, October 20, 1906, p. 431). The specimens of the resin prepared from Podophyllum peltatum were for the most part of our own manufacture, the others being procured through the ordinary channels. The resin of P. emodi was specially prepared.

Resin of P. peltatum.

Insoluble in Ammonia 7·04, 7·40, 11·80, 11·20, 7·88%

Resin of P. emodi.

Insoluble in Ammonia ... ... 58·0%

Although further experience is needful, Dott's proposed standard of not more than 15 per cent. insoluble does not appear to be too stringent.

Terebene.—Two considerable bulks, prepared from American Turpentine, and each having no effect on polarized light, were examined for specific gravity and subjected to distillation. The results were:—

Specific gravity	0·853	0·956
Distillate below 165°	1·0	1·0%
,, 165°–180°	97·0	92·0%

and confirm our often expressed views of the impossibility of the official requirement.

PHARMACOPŒIA REVISION.

THE recent publication of the Recommendations of the Committee of Reference in Pharmacy respecting certain published criticisms of the *British Pharmacopœia* (1898)—has awakened fresh interest in this subject. The form that these recommendations take is such as to invite criticism, and since their conclusions do not invariably coincide with the results of our own experience as published in our various Reports we have ventured to make a few remarks upon them.

Acid. Acetic. Glaciale.—We believe the melting point to be a more accurate criterion of the strength of glacial acetic acid than the titration test and suggest that the melting point of 14·7°C recommended should replace this test, such melting point, or better still an equivalent congealing point, to be determined by an approved method e.g. by the use of the Beckman apparatus.

Acid. Boric.—In our Fourteenth Report p. 25 we commented favourably on Thomson's method of titrating this acid in presence of glycerine. The standard of 98 per cent. proposed is not unduly stringent.

Balsamum Tolutanum.—We agree that the present official test requires revision or even deletion, and would suggest that other workers should report on the method published in Report No. 11 p. 30 which Gadd and others have found very satisfactory.

Benzoinum.—We consider, and we think our published records will confirm our view, that a standard of 10 per cent. insoluble in alcohol is too rigid a test for Sumatra Benzoin. A standard of not less than 20 per cent. of total balsamic acids calculated as Benzoic would be both more practicable and of far greater value.

Cannabis Indica.—As our published figures show (see this Report p. 8; No. 14, p. 8; No. 13, p. 17; No. 12, p. 9, etc.), we are able to confirm the statement that good Cannabis Indica rarely yields less than 11 per cent. to 90 per cent. alcohol.

Cetaceum.—The suggested minimum saponification value of 125 is too low, we should prefer 122.

Ext. Cannabis Ind.—Probably the explanation of the variation of this extract in its physical characters lies in the varying proportion of the alcoholic extract which is also soluble in water, the two portions being apt to separate more or less completely. Seeing that the resinous constituent is the therapeutically active one, we suggest that the alcoholic extract be washed with water and the resin only retained.

Ferrum Redactum.—We consider the standard of the U.S.P. for arsenic, viz., 1 in 100,000 is far too stringent, a maximum limit of 10 in 100,000 being more reasonable.

Guaiaci Resina.—A minimum of 90 per cent. soluble in alcohol, although fairly high, is obtainable.

Jaborandi Folia.—We have shown (Report No. 14, p. 13; this Report p. 11) the practical worthlessness of the ordinary Jaborandi leaves of commerce and agree with the proposed substitution of the leaflets of *Pilocarpus microphyllus.*

Pilula Hydrarg. Subchlor. Co.—See this Report p. 31.

Podophylli Resin.—Dott's method (see page 32) seems to be a valuable means of excluding the Indian podophyllin.

Sodii Sulphis.—We fully agree that the present official standard is impracticable, and should be reduced to 95 per cent.

Styrax praeparatus.—See page 19, also our notes on Bals. Tolu and Benzoin.

Zingiber.—We regret to see that the committee recommend the adoption of A. R. Bennett's proposed minimum limit of 5 per cent. yield to alcohol (90 per cent.). We have before (Reports No. 13, p. 14; No. 12, p. 18; No. 11, p. 13) protested against this proposition, and have given figures obtained from the examination of high-class samples in support of our contention.

We consider that the effect of fixing such a minimum would be to exclude the finer qualities of Jamaica Ginger.

PHYSIO-TOXIC STANDARDISATION.

A YEAR'S further experience in this direction has but confirmed our ideas as to the value of the principle adopted as a means of securing efficiency and uniformity in the therapeutical action of such Galenicals as do not lend themselves readily to the application of chemical methods. We reprint below the standards we have adopted for these preparations, adding that for Tincture of Strophanthus, which has been included in this section at the desire of several members of the medical profession.

In connection with physiological assay of fluid extract of Ergot, we are glad to note that the method we have adopted, *i.e.*, the measurement of the increase of blood-pressure caused by a certain dose, has received the approval of one of the foremost pharmacologists of the day, Dr. W. E. Dixon. This is well shown by the following extract from his paper read before the British Medical Association at Toronto. Speaking of Ergot, Dr. Dixon said:—" We further think that the only effective way of standardising the drug in this case is to note its action on the mammalian blood-pressure. The effect of Ergot on the cock's comb is of an entirely different nature, is not brought about, we believe, by vaso-constriction, and is, therefore, not necessarily a criterion of useful activity in the drug."

STANDARDS.

Liquid Extract of Ergot.—Normal Liquid Extract of Ergot shall be of such a strength that 0·66 c.c. shall cause a rise in blood pressure of 60 mm. in an animal weighing 1,500 grammes.

Tincture of Digitalis.—Normal Tincture of Digitalis shall be of such a strength that the minimum lethal dose per 100 gramme of frog is 16·5 minims, such dose proving fatal within 4 hours.

Tincture of Squills.—Normal Tincture of Squills shall be of such a strength that the minimum lethal dose per 100 gramme of frog is 20 minims, such dose proving fatal within 4 hours.

Tincture of Strophanthus. — Normal Tincture of Strophanthus shall be of such a strength that the minimum lethal dose per 100 gramme of frog is 4 mimims, such dose proving fatal within 4 hours.

We should here remark that we do not claim to make preparations to correspond exactly with these standards, our procedure being to prepare a batch exactly according to the directions of the British Pharmacopœia, and to test its activity with reference to these standards. Many separate tests are necessary to secure a correct average result, and to eliminate the possible disturbing effects of peculiarities in individual animals ; from the result a factor is obtained giving the comparative strength of the new preparation in relation to the above standards, and this factor is affixed to every bottle sent out.

TABLE

SHOWING SUGGESTED STANDARDS, RANGES
OF SPECIFIC GRAVITY, ETC.,
FOR

GALENICAL PREPARATIONS.

Name of Preparation.	Range of Specific Gravity.	**STANDARD.** (Where there is no active principle mentioned the figure given represents total extractive.) Grammes per 100 c.c.	Range of percentage (by volume) of Alcohol.	REMARKS
Acetum Cantharidis	1·066 to 1·072			
,, Ipecacuanhæ	0·991 to 0·993	3·62 HA. 0·1 total alkaloid	11 to 12·5	
,, Scillæ	1·035 to 1·040	8·0 4·0 acetic acid		
Collodium	0·775 to 0·782	2·0		
,, Flexile	0·790 to 0·797	6·5		
Decoctum Aloes Compositum	1·001 to 1·004	5·6	16 to 17	
,, Granati Corticis Conc.		30·0		
,, Hæmatoxyli Conc.		3·0		
Extractum Belladonnæ Liquidum	0·896 to 0·912	*0·75 total alkaloid	72·0 to 75·0	
,, ,, Viride		1·0 total alkaloid		
,, Cascaræ Sagradæ Liquidum	1·070 to 1·080	26·0	17·0 to 18·0	
,, Cimicifugæ Liquidum	0·890 to 0·900	12·5	74 to 78	
,, Cinchonæ Liquidum	1·115 to 1·150	*5·0 total alkaloid	10·5 to 12·0	
,, Cocæ Liquidum	1·004 to 1·014	0·5 total alkaloid	45·5 to 49·5	
,, Colocynthidis Compositum†		20 ether soluble		
,, Ergotæ Liquidum	1·020 to 1·027	15·0	31·5 to 32·5	Physio-toxically standardised, [see page 37
,, Filicis Liquidum	1·000 to 1·019			
,, Glycyrrhizæ Liquidum	1·140 to 1·150	42·0	16·0 to 18·0	
,, Hamamelidis Liquidum	1·025 to 1·050	21·0	33 to 34	
,, Hydrastis Liquidum	1·025 to 1·040	20·0	37·5 to 38·5	
,, Hyoscyami Viridi		0·1 total alkaloid minm.		
,, Ipecacuanhæ Liquidum	0·885 to 0·910	*2·00 to 2·25 total alkaloid	75·0 to 79	
,, Jaborandi Liquidum	1·020 to 1·040	20·0	33 to 34	
,, Jalapæ		20 resin insoluble in ether		
,, Nucis Vomicæ Liquidum	0·950 to 0·970	*1·5 strychnine	57·5 to 61·5	
,, Opii Liquidum	0·985 to 0·990	*0·75 morphine	17·5 to 18·5	

Extractum Pareiræ Liquidum	1·050 to 1·065	22·5	20 to 22
,, Sarsæ Liquidum	1·080 to 1·090	20·0 (without glycerine)	15 to 17
,, Strophanthi ‡		4·0 strophanthin	
,, Taraxaci Liquidum	1·070 to 1·090	25·0	16 to 20
Glycerinum Acidi Borici	1·345		
,, ,, Carbolici	1·230		
,, ,, Tannici	1·288 to 1·292		
,, Aluminis	1·288 to 1·292		
,, Boracis	1·280 to 1·295		
,, Pepsini	1·190 to 1·200	1 fluid dr. should dissolve 12,000 grains hard boiled white of egg.	
Infusum Aurantii Conc.		10·2	
,, ,, Compositum Conc.		7·2	
,, Buchu Conc.		6·0	
,, Calumbæ Conc.		3·5	
,, Caryopylli Conc.		5·0	
,, Cascarillæ Conc.		2·0	
,, Chiratæ Con.		4·5	
,, Cinchonæ Acidum Conc.		1·0 total alkaloid	
,, Cuspariæ Conc.		8·0	
,, Digitalis Conc.		1·6	
,, Gentianæ Compositum Conc.		6·0	
,, Krameriæ Conc.		8·0	
,, Lupuli Conc.		7·0	
,, Quassiæ Conc.		0·25	
,, Rhei Conc.		10·0	
,, Scoparii Conc.		15·0	
,, Senegæ Conc.		10·0	
,, Sennæ Conc.		14·0	
,, Serpentariæ Conc.		4·5	
,, Uvæ Ursi Conc.		10·0	
Linimentum Aconiti	0·865 to 0·875	0·25 total ether soluble alkaloid	78·0 to 80·0
,, Belladonnæ	0·880 to 0·900	*0·375 total alkaloid	69·0 to 72·0

* Officially Standardized. † Scammony resin ‡ *P.J.*, 1898 (2), p. 665.

Name of Preparation.	Range of Specific Gravity.	STANDARD. (Where there is no active principle mentioned the figure given represents total extractive.) Grammes per 100 c.c.	Range of percentage (by volume) of Alcohol.	Remarks
Linimentum Camphoræ	0·924 to 0·927	21·5 camphor		
,, ,, Ammoniatum ..	0·866 to 0·872		57·0 to 58	
,, Saponis	0·895 to 0·900		62 to 64·0	
Liquor Calumbæ Conc.	0·990 to 0·996	4·25	19·0 to 21·0	
,, Chiratæ Conc.	1·000 to 1·010	5·5	18·0 to 19·0	
,, Cuspariæ Conc.	1·005 to 1·015	10·0	18·0 to 19·0	
,, Hamamelidis	0·980 to 0·985		16·0 to 18·0	
,, Iodi Fortis	1·010 to 1·025	11·5 iodine	76·0 to 77·0	
,, Krameriæ Conc.	1·015 to 1·025	10·0	18·0 to 19·0	
,, Picis Carbonis	0·855 to 0·865	2·5		
,, Quassiæ Conc.	0·975 to 0·980	0·30	18·0 to 19·0	
,, Rhei Conc.	1·020 to 1·030	12·5	18·0 to 19·0	
,, Sarsæ Compositus Conc	1·030 to 1·040	15·0	18·0 to 20·0	
,, Senegæ Conc...	1·015 to 1·025	12·5	18·5 to 22·0	
,, Sennæ Conc.	1·040 to 1·060	17·5	18·0 to 19·0	
,, Serpentariæ Conc.	0·990 to 1·000	5·0	18·0 to 19·0	
Mistura Sennæ Co.	1·110 to 1·118	16·5	14·4 to 16·6	
Oxymel	1·320*	4·4 acetic acid		
,, Scillæ	1·320*	2·0 acetic acid		
Pulv. Glycyrrhizæ Comp.		9·0 sulphur		
,, Rhei Comp.		68 to 70 ash		
Succus Belladonnæ	0·980 to 0·990		18·0 to 22·0	
,, Conii	0·980 to 0·990		18·0 to 22·0	
,, Hyoscyami	0·980 to 0·990		18·0 to 22·0	
,, Scoparii	0·980 to 0·990		18·0 to 22·0	
,, Taraxaci	0·995 to 1·000			
Syrupus Aromaticus	1·148 to 1·156			
,, Aurantii	1·270 to 1·280			
,, Calcii Lactophosphatis	1·310 to 1·320			
,, Cascaræ Aromaticus	1·110 to 1·125			

Syrupus Chloral	1·315 to 1·320			
,, Codeinæ	1·320 to 1·328	[each fluid dr.		
,, Ferri Phosphatis	1·270	*Fe_3 $(PO_4)_2$—1 gr. in		
,, ,, Phos. c. Quin. et Strych ..	1·275 to 1·285			
,, Glucosi	1·363 to 1·370			
,, Hemidesmi	1·325 to 1·330			
,, Limonis	1·290 to 1·300			
,, Pruni Virginianæ	1·300 to 1·320			
,, Rhei	1·310 to 1·320			
,, Rosæ	1·325 to 1·330			
,, Scillæ	1·330 to 1·335			
,, Sennæ..	1·280 to 1·290			
,, Tolutanus	1·330 to 1·335			
,, Zingiberis	1·300 to 1·310			
Tinct. Aconiti	0.890 to 0.897	0·02 total ether soluble alkaloid	68·0 to 70·0	
,, Aloes	0·970 to 0·985	8·5	38·0 to 41·0	
,, Arnicæ	0·890 to 0·894	0·6	68·8 to 69·8	
,, Asafetidæ	0·914 to 0·920	10·0	56·0 to 62·0	
,, Aurantii	0·880 to 0·890	2·0	72·5 to 76·0	
,, Belladonnæ	0·912 to 0·920	*0·05 total alkaloid	60·0 to 61·0	
,, Benzoini Comp.	0·900 to 0·905	About 5·0 total balsamic acids, of which about 2·0 are free and 3·0 combined.	68·5 to 72·5	
,, Buchu	0·930 to 0·935	4·0	56·0 to 57·0	
,, Calumbæ	0·920 to 0·925	1·0	56·0 to 58·0	
,, Camphoræ Comp.	0·915 to 0·920	*0·05 morphine	56·0 to 59·0	
,, Cannabis Indicæ	0·844 to 0·850	4·0	83·0 to 86·0	Physio-toxically standardised,
,, Cantharidis	0·835 to 0·838	0·25	87·0 to 89·0	[see page 37
,, Capsici	0·890 to 0·897	1·50	67·5 to 69·5	
,, Cardamomi Comp.	0·945 to 0·950	6·50	54·0 to 56·0	
,, Cascarillæ	0·900 to 0·905	1·6 resin	62·5 to 67·5	
,, Catechu	0·972 to 0·978	14·5	51·0 to 53·0	
,, Chiratæ	0·920 to 0·924	0·8	56·0 to 58·0	
,, Chloroformi et Morph. Comp. ..	1·010 to 1·020		52·0 to 54·0	

* Officially Standardized.

Name of Preparation.	Range of Specific Gravity.	**STANDARD.** (Where there is no active principle mentioned the figure given represents total extractive.) Grammes per 100 c.c.	Range of percentage (by volume) of Alcohol.	REMARKS.
Tinct. Cimicifugæ	0·922 to 0·928	2·0	57·0 to 59·0	
,, Cinchonæ	0·915 to 0·925	*1·0 total alkaloid	63·0 to 64·5	
,, Cinchonæ Comp.	0·915 to 0·921	5·00 *0·5 total alkaloid	62·0 to 68·0	
,, Cinnamomi	0·900 to 0·904	2·4	66·0 to 68·0	
,, Cocci	0·950 to 0·955	2·5	42·0 to 44·0	
,, Colchici Seminum	0·945 to 0·955	0·10 total alkaloid	42·0 to 44·0	
,, Conii	0·895 to 0·900	0·09 total alkaloid	66·0 to 68·5	
,, Croci	0·924 to 0·928	3·00	56·0 to 58·0	
,, Cubebæ	0·840 to 0·845	2·0 oleo-resin	83·0 to 85·0	
,, Digitalis	0·928 to 0·934	3·6	53·0 to 57·5	Physio-toxically standardised, [see page 37
,, Ergotæ Ammon.	0·932 to 0·939	4·0	48·0 to 52·0	
,, Ferri Perchlor	1·085 to 1·088		18·0 to 21·0	
,, Gelsemii	0·917 to 0·925	0·025 total alkaloid	57·0 to 59·0	
,, Gent. Comp.	0·964 to 0·968	5·0	42·5 to 43·5	
,, Guaiaci Ammon.	0·894 to 0·900	15·0	69·0 to 71·0	
,, Hamamelidis	0·950 to 0·954	2·0	42·0 to 44·0	
,, Hydrastis	0·920 to 0·926	2·5	56·0 to 58·0	
,, Hyoscyami	0·950 to 0·965	0·008 total alkaloid	40·5 to 42·5	
,, Iodi	0·878 to 0·882	*2·5 iodine	84·0 to 86·0	
,, Jaborandi	0·950 to 0·960	0·048 total alkaloid	42·0 to 44·0	
,, Jalapæ	0·905 to 0·910	*1·5 resin	65·0 to 67·0	
,, Kino	0·992 to 0·996	5·0 kino-tannic acid	43·0 to 44·5	
,, Krameriæ	0·934 to 0·938	5·0	56·0 to 58·0	
,, Lavand Comp.	0·836 to 0·840	0·6	86·5 to 88·5	
,, Limonis	0·880 to 0·888	2·0	67·5 to 71·5	
,, Lobeliæ Æther..	0·810 to 0·816	0·07 lobeline	58·0 to 60·0	
,, Lupuli	0·930 to 0·940	4·0	54·0 to 57·0	
,, Myrrhæ	0·850 to 0·855	5·6	84·0 to 86·0	
,, Nucis Vomicæ	0·910 to 0·914	*0·25 strychnine	58·0 to 64·0	

Tinct. Opii	0·955 to 0·960	*0·75 morphine	40·0 to 44·0	
,, Opii Ammon.	0·895 to 0·900	*0·113 morphine	60·0 to 63·0	
,, Podophylli	0·850 to 0·855	3·65 resin	84·5 to 89·0	
,, Pruni Virg.	0·930 to 0·938	3·0	52·0 to 57·0	
,, Pyrethri	0·895 to 0·900	2·25	66·0 to 69·0	
		(0·22—0·36)		
,, Quassiæ	0·944 to 0·948	0·05 quassin	42·0 to 44·0	
,, Quillaiæ	0·918 to 0.924	1·25	56·0 to 58·0	
,, Quininæ	0·885 to 0·895		72·5 to 76·0	
,, ,, Ammon.	0·925 to 0·928		53·0 to 54·0	
,, Rhei Comp.	0·970 to 0·975	4·50 (Exclusive of Glycerine	51·0 to 53·0	
,, Scillæ	0·955 to 0·962	10·0	52·0 to 54·0	Physio-toxically standardised, [see page 37
,, Senegæ	0·935 to 0·938	6·5	55·0 to 57·0	
,, Sennæ Comp.	0·985 to 0·994	10·00	38·5 to 40·5	
,, Serpentariæ	0·896 to 0·900	2·00	66·0 to 68·0	
,, Stramonii	0·950 to 0·964	0·04 total alkaloid	42·0 to 44·0	
,, Strophanthi	0·892 to 0·895	0·2 strophanthin	67·0 to 69·0	Physio-toxically standardised, [see page 37
,, Sumbul	0·895 to 0·900	2·5	66·0 to 69·0	
,, Tolutana	0·860 to 0·865	about 3 balsamic acids ⅓ of which are free	80·0 to 82·0	
,, Valerianæ Ammon.	0·935 to 0·942	3·0	50·0 to 54·0	
,, Zingiberis	0·835 to 0·840	0·4	88·5 to 89·5	
Vin. Colchici	1·010 to 1·015	7.0		
,, Ferri		0 40 total Fe.		

---

* Officially Standardized

SOUTHALLS' STANDARD POWDERS

For ANALYSTS and PHARMACISTS.

IN view of the present-day wide-spread adulteration of powdered drugs, and in order to supply a recognised need of candidates for the Microscopic Examination in Food and Drugs of the Institute of Chemistry, we have introduced the above collection.

The object of the collection is to supply a series of "Standard Powdered Foods and Drugs," which the analyst or pharmacist may have beside him as an absolute criterion of purity when examining doubtful samples, and which should prove of the greatest value to public analysts, students, and all concerned with the microscopical examination of foods and drugs.

The need of a collection of such standards is well shown by the numerous enquiries received from all parts, sets having been supplied to analysts and institutions at home and in New Zealand, Australia, the United States, etc.

Full particulars, with lists of contents, free on application.

PRESS NOTICES.

THE ANALYST, *October*, 1905;—"Will be found very useful when a microscopical examination of a doubtful specimen has to be made."

THE CHEMIST AND DRUGGIST, *August 12th*, 1905:—"We are sure that Messrs. Southall have taken pains to supply genuine samples, upon which the utmost reliance can be placed."

THE PHARMACEUTICAL JOURNAL, *August 5th*, 1905:—"Should prove of very great value to candidates for the microscopical examination in foods and drugs in the Institute of Chemistry."

GUARANTEE OF QUALITY.

ALL Tinctures, Infusions, Liquid Extracts, and in fact most of the Galenicals we supply are Standardised by our special methods, full particulars of percentage contents being in most instances given on the label.

When we label a drug or preparation P.B. we take full responsibility for its quality, and are prepared to stand by the fact that it is as labelled when it leaves our warehouse, and similarly we guarantee all official preparations to be in accordance with the descriptions on the labels.

THE QUALIFIED RETAIL CHEMIST AND ANALYTICAL WORK.

WE again wish to draw the special attention of our customers and others to the arrangements we have made whereby they may undertake analytical work required by the public. We are fully convinced that a lucrative business may be done in this class of work if proper facilities for obtaining analyses on reasonable terms were placed within reach of the public. The daily increasing demand for assurance as to the purity of foods and drinks should, in our opinion, be put to profitable use by qualified chemists, and where, as is often the case, it is impossible for them to undertake work of this class themselves, it is obvious to us that the opportunity of having it done speedily, and of at the same time sharing in the proceeds, will be generally acceptable.

Detailed circulars will be sent free on application.